

An Application of Logit Regression on Socio Economic Indicators in Gujarat

Dr. Mahesh Vaghela

Principal and Head of Department of Statistics, N. C. Bodiwala Commerce College, Ahmedabad, Gujarat, India

ABSTRACT

The use of real-time evaluation technologies to think about human behavior in a social setting is known as social experiences. This can be refined by examining a social gathering of individuals, reviewing a subset of data insights, and assessing a large amount of data relating to people and their behavior in a quantitative manner. In this study researcher examined Socio Economics indicators like Education, Health and Employment in Gujarat he also used Logit Regression as a statistical tool. It will be found that the most of the Sub Indicators are positively impact on Logit Regression model.

KEYWORDS: Logit Regression, UHDI, Social Sector, Social Indicator

How to cite this paper: Dr. Mahesh Vaghela "An Application of Logit Regression on Socio Economic Indicators in Gujarat" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-4, June 2021, pp.1302-1307, URL: www.ijtsrd.com/papers/ijtsrd42573.pdf



IJTSRD42573

Copyright © 2021 by author (s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



1. THE THEORY OF SOCIAL SECTOR AND SOCIAL INDICATORS

Social experiences is the usage of real assessment systems to mull over human direct in a social environment. This can be refined through studying a social affair of people, evaluating a subset of data insights and quantifiable assessment of a lot of data that relates to people and their practices.

Social expert have used social estimations for certain, reasons including

1. The appraisal of the idea of organizations available to a social event of people.
2. Analyzing acts of get-togethers of people in their present condition and excellent conditions.
3. Determining the prerequisites of people through real testing approach.

Experiences and quantifiable assessment have become a basic component of humanism. Experiences is of fundamental importance in all of the lead sciences like Economics, Psychology, Political science, Sociology, Education, etc The usage of estimations is so wide spread in the humanism that various foundations, for instance, Harvard in like manner have made verifiable associations which can focus in on the quantitative pieces of social science. In specific spots they have made parts of decision sciences for study and investigation endeavors to be executed in different controls.

2. SOCIAL SECTOR

All amicable region quantifiable activities for combination, show and comprehension of data at central and state

levels are assembled regularly under the going with arrangements of portrayal. (1) Human Development (2) Education (3) Health organizations (4) Women and child Development (5) Water supply and Sanitation (6) Rural new development (7) Rural Housing (8) Urban development and metropolitan Housing (9) Employment and getting ready (10) Welfare of more delicate fragments (11) Women Welfare (12) Environment (13) Ecological guidance, etc

The quantifiable information under all of the above heads are accumulated, amassed and circulated at state similarly as at central levels. All of the parts in the above list tends to express conditions and contrasting procedures taken by the public power and they are clearly referred to in the appropriation year insightful.

3. LAYOUT OF ECONOMY FOR ALL INDIA

GDP at current expenses for the year 2012-13 is evaluated at Rs.99.9 Lakh crores and that for 2013-14 is surveyed at Rs.113.5 Lakh crore. This shows an improvement of 13.1% and 13.6% during these years. Certified GDP (i.e., GDP at reliable costs stays at Rs. 92.8 Lakh crores for 2012-13 and Rs. 99.2 Lakh crores for 2013-14). This shows advancement of 5.1% during 2012-13 and 6.9% during 2014-15 is evaluated as Rs. 106.57 Lakh crores, showing an improvement of 7.4 percent. Per capita at current expenses is Rs. 71,593 and Rs. 80,388 for a serious long time 2012-13 and 2013-14 independently. For the year 2014-15 it is surveyed to be Rs.88, 538 in this way showing a rising of 10.1% when stood out from before

year. Per capita pay at steady expenses (2011-12) is surveyed at Rs. 66,344 and Rs. 69,959 for the years 2012-13 and 2013-14 independently. During the year 2014-15, it is surveyed to be Rs. 74,193 in this manner showing a climb of 6.05% when stood out from before year.

4. BLUEPRINT OF ECONOMY FOR GUJARAT STATE

Net state Domestic Product (GSDP) at factor cost at predictable expenses in 2013-14 has been evaluated at Rs. 4,52,625 crore as against Rs. 4,16,163 for 2012-13 appearance an improvement of 8.8% GSDP at factor cost at current expenses in 2013-14 has been surveyed at Rs. 7,65,638 crores as against Rs. 6,58,540 crores in 2012-13 thusly showing an improvement of 16.3% during the year. The segment of fundamental, discretionary and tertiary regions has been represented as 22.1%, 43.1% and 43.8% independently to amount to GSDP in 2013-14 at current expenses. Per capita NSDP at factor cost at consistent expenses is evaluated at Rs. 63,168 of each 2013-14 as against Rs. 59,157 out of 2012-13 thusly showing an improvement of 6.8% during the year. Per capita NSDP at factor cost at current expenses has been evaluated at Rs. 1,06,831 out of 2013-14 as against Rs.93046 in 2012-13 in this way showing an extension of 14.8% during the year.

5. DIFFERENT TYPES OF INDICATORS

Keeping in see the social region some critical markers can be recorded quickly as under:

1. Human Development Index (HDI) and its situating (It is for country sagacious assessment and the identical at state level SHDI can be valuable for state wise connection).
2. Education (Quality of Education, Education Expenditures, Drop out extents, understudy/educator extent, etc)
3. Health (Different Health Indicators, Health Expenditures, Expenses on prosperity to GDP, general prosperity utilization to amount to spending plan, etc)
4. IMR, MMR, CBR, CDR, Life trust after entering the world, etc
5. Housing (Urban and Rural) (Average family size, total number of houses, House inhabitation, Housing account, Affordable housing needs, Employment
6. Water stock and Sanitation, etc
7. Environment, etc

6. LOGIT REGRESSION

This model is suitable when the response takings one of just two plausible merits its - a progress or a displeasure, or all the for the most part the proximity or absence of a property of derived model. It might want to have the likelihoods in rely upon a path of observed criticizes x' . The most upfront thought is given in a chance to be a straight volume of the criticizes, state

$$\varphi_i = Y_i \cdot a$$

Here, 'a' is a vector of model coefficients. The considered approach of model is once in a while called the straight probability calculations. This model is often measured from discrete info applying normal least squares. One issue with this model is that the probability of total observations 'n' on the left-hand-side must be wherever in the range of 0 to 1, yet the conventional indicator $Y'a$ on

the right-hand-side can take any open approval, so there is no evidence that the expected assets is to be in the right range excluding if compound confines are required on the quantities. A basic response for this issue is to change the possibility to oust the array quarantines, and model the change as a thru volume of grazes. It does this in two phases. The first likelihood can be resolute as odd to the value higher than the median:

$$\varphi = \text{logit}(\tau_i) = \log \frac{\tau_i}{1 - \tau_i}$$

It has the influence of vacating the ground restriction. The possibility of reducing till 0, the chances to be 0 and the negative aspects of logit perpetual values. On other hand the chances for occurrences of logit may be zero. Thus, the theoretical approach of logit function ranges (0, 1) to the best fit of line of the curves. In any case if the probability is defined 0.5, the changes are obtaining an even is zero or it skewed negative. Opposite of the same higher the value for logit 0.5 relates to values nearer to one and it is skewed positive. For construction of logit the model coefficient say, a can be presented rewrite as simple model. The presentation of logit model can be opposite side to the mean. Thus, the probability related with the unit change in any parameters holding changes in mean of the logit model. While interactive results in the logit scale will be new at first, it has the favorable position that the model is fairly direct in this specific scale. Exponentiation Equation is find that the probabilities for the i^{th} unit are given by exponential form of model.

This articulation illustrates a multiplicative model for the probability. For instance to change the j^{th} indicator by one unit while holding every single other variable steady, it would produce the chances by predicted estimation to coefficient a. For further discussion if $Y_i \cdot a$ has been increased by Y_j value adding to one unit change in the value of parameter. It can be rewrite as $Y_i \cdot a + a_j$. Exponentiation of the value gets $Y_i \cdot a$ times expected in a. Hence, the exponentiation measurement 'a' has to the chances of proportion. Making an analysis of the outcomes into multiplicative values for the probabilities, or proportions of probabilities is regularly useful, on the grounds that manage a gradually familiar scale while holding a discreetly simple model.

The probability of i in the logit gives the model as follows:

$$\tau_i = \frac{\text{Exp}(Y_i \cdot a)}{1 + \text{Exp}(Y_i \cdot a)}$$

The left side of the functional relationship is based on natural scale of probability. On right hand side it shows a non-direct probability indicators and there is no other method to present the impact of likelihood of expressing the parameter by unit change till changing in the value of other variable.

It can be acquiring uncertain responses by taking substitute values for $Y_j \cdot a$ that certainly predicts best fit values to constant. The rule of remainder for derived model can be given as:

$$\frac{\partial \tau_i}{\partial Y_{ij}} = a_i \tau_i (1 - \tau_i).$$

The rule of remainder make changes in the value of j^{th} indicator on the probability of τ for i^{th} value relies upon the coefficient a_j and the estimation of the probability.

Once in a while the study assesses T for ith value to the mean. The tentative outcomes have the impact of the deviation of the mean to the mean due to the changes on values of ith relies values in model.

7. APPLICATION OF LOGIT REGRESSION TO DEVELOPMENT INDICATORS IN AHMEDABAD DISTRICT

The multivariate regression model is constructed for listed eleven parameters of secondary data collected for Ahmedabad district for the year 1999 to 2017. One of the objective of the study is focusing to examine the actual execution of secondary data towards the primary information collected by the researcher. For this purpose a method of survey is used and 520 samples are collected

for Ahmedabad district. The respondents are academicians, administrators and research scholars. The sample is derive by using stratified sampling and final cluster is defined by using 95% significance level of normal function as follows:

$$\text{Total number of Samples (n)} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \frac{z^2 \times p(1-p)}{e^2 N}}$$

The stated form has resulted 514 samples. Thus, this research is determined for round off of 520 samples. An investigational structure of tobit model can be studied for Ahmedabad district for selected 40 variables. The list of defined variables is given below.

Table 1 List of Variable of Data Collection

Code of Variable	Statement	Name of Variable
Primary Education		
PEDU1	Number of Schools providing primary education have improved	A1
PEDU2	Quality of Primary Education has drastically improved	A2
PEDU3	Student-Teacher ratio in Primary school has improved significantly	A3
PEDU4	Drop out ratio at primary school level has reduced drastically	A4
PEDU5	Basic Infrastructure of primary education in Ahmedabad district has improved	A5
Higher Education		
HEDU1	Number of Higher education institution have increased in Ahmedabad district	A6
HEDU2	Higher education has become more pragmatic in Ahmedabad district	A7
HEDU3	Teachers at higher education level are more competitive in Ahmedabad district	A8
HEDU4	All necessary support facilities are available in Higher Education at Ahmedabad district	A9
HEDU5	There is significant improvement in quality courses in Higher Education In Ahmedabad district	A10
Primary Health Care		
PHLT1	Ahmedabad district has witness rapid growth of Primary health Centres	A11
PHLT2	Infrastructural Facilities at Primary Health canters have improved significantly	A12
PHLT3	There is adequate number of medical staff available for primary health care in Ahmedabad district	A13
PHLT4	Government is providing all the necessary support for development of Primary Health Care	A14
PHLT5	The reach of primary health centres have improved in Ahmedabad district	A15
Advanced Health Care		
AHLT1	Ahmedabad district has witness quality hospitals for Advanced Health care	A16
AHLT2	Ahmedabad district has good quality of Infrastructure for Advanced Health care	A17
AHLT3	Good Quality doctors are available in Ahmedabad district in Advanced Health care	A18
AHLT4	All the necessary Medical Resources are available for Advanced Health care in Ahmedabad district	A19
AHLT5	Ahmedabad district has facilities for the treatment of all the life threatening diseases	A20
Skilled Employment		
SEMP1	There is significant growth in rate of skilled employment in Ahmedabad district	A21
SEMP2	Growth of corporatisation and industrialisation have led to growth of skilled employment in Ahmedabad district	A22
SEMP3	Today's Educated Youth in Ahmedabad district is able to find employment easily	A23
SEMP4	Ahmedabad district has all the necessary infrastructure for the growth of skilled employment	A24
SEMP5	Quality of Skilled Employment level in Ahmedabad district has improved significantly	A25
Unskilled Employment		
UEMP1	Level of Employment for unskilled has improved significantly in Ahmedabad district	A26
UEMP2	There are ample opportunities available for the employment of unskilled in Ahmedabad district	A27
UEMP3	Growth of SMEs and MSMEs have contributed largely to the development of Unskilled employment in Ahmedabad district	A28
UEMP4	Growth in Unskilled employment has reduced the rate of unemployment drastically in Ahmedabad district	A29
UEMP5	There are ample Infrastructural facilities available for the growth of unskilled employment in Ahmedabad district	A30

Situational Moderators		
SM1	Frequent changes in environmental factors have played significant role in Social development	A31
SM2	Cultural factors plays significant role in social development in Ahmedabad district	A32
SM3	Ahmedabad district has witness good social harmony amongst all the state in the country	A33
SM4	Changes in Economy plays significant role in Social Development in Ahmedabad district	A34
SM5	Growth of Media and Technology has contributed well in social development in Ahmedabad district	A35
Government Moderators		
GM1	Government Policies are playing significant role in social development in Ahmedabad district	A36
GM2	Ahmedabad district Government is very active at policy implementation for social development	A37
GM3	Government is undertaking adequate awareness programme for Policies for the betterment of people	A38
GM4	Government has adequately played role of facilitator for Social Betterment	A39
GM5	Attitude of Government towards Socio-Economic Development is very much positive	A40
UHDl	Urban Human Development Index	A41

The discussed logit model is applied to the collected primary data for the indicators of development of Ahmedabad district. The data already framed in binary forms and used earlier to construct tobit model. For each of the variable the median is defined as phase of parameter. The conditional formatting is used to code the value of variables for 0 and 1. The coding is applied for all 40 selected parameters and one dependent variable UHDl. The final construction of logit model is given in table 2.

Table 2: Logit, using observations 1 to 520 Dependent variable: UHDl

	Coefficient	Std. Error	z	Slope*
Const.	-0.125163	0.354246	-0.3533	
PEDU1	16.8114	1468.20	0.01145	0.896759
PEDU2	1.65517	0.671728	2.464	0.387985
PEDU3	0.347895	0.429925	0.8092	0.0866277
PEDU4	23.9984	787.084	0.03049	0.995784
PEDU5	36.9765	1114.36	0.03318	0.998245
HEDU1	-21.2459	701.589	-0.03028	-0.998778
HEDU2	-38.3778	557.385	-0.06885	-0.988092
HEDU3	2.83799	1.64889	1.721	0.592726
HEDU5	2.01031	801.036	0.002510	0.456295
PHLT1	-1.24692	1896.28	-0.0006576	-0.283074
PHLT3	-0.700213	878.212	-0.0007973	-0.169289
PHLT4	0.701231	0.395162	1.775	0.173097
PHLT5	8.18114	0.4256	19.22	0.2142
AHLT3	-1.00726	0.617716	-1.631	-0.239922
AHLT4	-2.99762	1.19427	-2.510	-0.578683
AHLT5	20.5092	55.9906	0.3663	0.978653
SEMP1	20.6917	529.584	0.03907	0.993642
SEMP4	0.422003	0.816407	0.5169	0.105035
UEMP2	-3.82838	1.43178	-2.674	-0.647505
UEMP4	-0.567984	0.540515	-1.051	-0.136704
SM1	-20.3834	0.687705	-29.64	-0.949761
SM2	-1.56603	771.546	-0.002030	-0.332503
GM5	-42.8916	66.2525	-0.6474	-0.999718
Mean dependent var	0.467308	S.D. dependent var	0.499411	
McFadden R-squared	0.147126	Adjusted R-squared	0.080334	
Log-likelihood	-306.4582	Akaike criterion	660.9163	
Schwarz criterion	763.0082	Hannan-Quinn	700.9096	

*Evaluated at the mean, Number of cases 'correctly predicted' = 338 (65.0%), F (a'x) at mean of independent vars = 0.499, Likelihood ratio test: Chi-square (23) = 105.732 [0.0000]

The study is executed for 520 data sets of development indicators listed for Ahmedabad district. The F (a'x) at mean of independent variations is considered as 0.499 (lower than 0.5) shows best fit of model. The logit model based on mean evaluated total 338 cases (65%) accuracy level for correct prediction of development indicators. The computed value of chi-square is 105.73 is higher than the significant value. It reject the null hypothesis that is indicating the error to the model is significance to not best fit the model. The model summary statistics allow to conclude the model.

$$\begin{aligned} \text{UHDI} = & -0.125 + 16.81 \text{ PEDU1} + 1.65 \text{ PEDU2} + 0.34 \text{ PEDU3} + 23.99 \text{ PEDU4} + 36.97 \text{ PEDU5} - 21.24 \text{ HEDU1} \\ & - 38.37 \text{ HEDU2} + 2.83 \text{ HEDU3} + 2.01 \text{ HEDU5} - 1.25 \text{ PHLT1} - 0.7 \text{ PHLT3} + 0.70 \text{ PHLT4} + 8.18 \text{ PHLT5} \\ & - 1.007 \text{ AHLT3} - 2.99 \text{ AHLT4} + 20.51 \text{ AHLT5} + 20.69 \text{ SEMP1} + 0.422 \text{ SEMP4} - 3.82 \text{ UEMP2} \\ & - 0.56 \text{ UEMP4} - 20.38 \text{ SM1} - 1.57 \text{ SM2} - 42.89 \text{ GM5} \end{aligned}$$

8. CONCLUSION:

The model statistics are compiled and accessible to derive conclusions. It shows the model is statistically significant. The constant of model is negative, thus negative sign of the parameter decrease the value of UHDI and positive value of parameter raised value of the UHDI. The first co-efficient is derived for statement that number of schools providing primary education have improved. The code of variable is defined PEDU1 and it is computed 16.81. The value is positively associated with model, shows positive approach of the experts. They are agreed that the primary education have improved for all schools. On other hand the second parameter of primary schools PEDU2 is recorded with 1.65 value of co-efficient. It shows that the primary education has drastically improved. Lastly the government has executed various method of selection and even twisted teaching policies, modules of teaching, infrastructure. These all are supporting the quality of primary education. The third parameter is also improved with 0.347 shows 37.4% direct impact of PEDU3 i.e. students –teachers’ ratio is improved significantly. The experts are agreed that it is improved and it has playing important role to UHDI in Ahmedabad district. The fourth parameter of education is also found significant PEDU 4 that shows dropout ratio at primary schools level has reduced drastically. Total 23.99% experts are agreed with the statement that make positive view about the dropout in schools. The fifth statement is also justify by the binary tobit model. It shows 36.97% impact of derived statement. It is about the basic infrastructure of primary education in Ahmedabad district has improved. The experts are positively stated about the statement. The second parameter is relate to the higher education. The experts opinion about the HEDU1 – Number of higher education institution have increased in Ahmedabad district is negative. The value 21.24 shows negative relativity towards the UHDI. It shows that according to the opinion of experts the higher secondary level schools are not met the requirement of the students of Ahmedabad district. The second parameter also stated about pragmatic of higher education in Ahmedabad district. The experts have negative opinion for the same. Third parameter of higher education is also given priority by the model. HEDU3 is a derived statement about the teachers at higher education level are more competitive in Ahmedabad district. The experts are agreed at certain level. The value of co-efficient (2.83%) shows lower impact of the statement to the development of education in Ahmedabad district. The fifth listed variable is shorted by the tobit model. It has positive impact of 2.01% to the UHDI model. The statement is about significant improvement in quality courses in higher education in Ahmedabad district. The experts are agreed that the quality of courses in higher education improved and it will play important role in development.

The second important parameter is health for testing the development. The first parameter of primary health care is listed by the model. The parameter PHLT1 is criticized by the experts. It has negative impact to growth and development. It shows 1.24% negative impact to the

model. The statement derived for rapid growth of primary health centers developed in Ahmedabad district. The third statement is relate to adequacy of medical staff available for primary health care. The experts are agreed that the centers are improved. The model indicates impact of 0.7% for the statement effect. The fourth parameter is determined by the model of primary health care. The third statement inquired was about government support given to the primary health care centers. The experts are positively response towards the statement. The fifth statement is also retrieve by the model. It is PHLT5 and the statement is about the resources to reaching the primary health centers is improved or not. The experts are positively reply about the statement. An examining the statements derived for primary health care. Majority statements are positively concerned by the experts. It indicates that the primary health status of the district is improved. The improvement shows direct support to UHDI of district.

The second resource for maintaining health status is advanced health care resources. The third, fourth and fifth statements are listed by the model. Amid them third and fourth statement is assigned negative sign whereas the fifth statement is getting positive response towards the model. The third statement was inquired about the availability of good quality doctors – as per experts’ opinion it required to be improve. It has negative approach to the development. Similarly, the experts are not fully agree about the availability of all the necessary medical resources’ to health care centers. The fifth statement is determined for facilities for the treatment of all the life threatening diseases. The experts are positively concerned about the statement. It shows 20.5% impact of the variable. The overall experts’ opinion about advanced health care is not found positive. It clearly indicates that for better output of advanced health care the authorities should work hard. It is indirectly affected to the growth of UHDI of district.

In inquiry of skilled employment only first and fourth statements were occupy by the model. The first statement is stated about significant growth in rate of skilled employment in the district. The experts view is recorded negative. On other hand they have positive approach towards the fourth statement that the district is graced with necessary infrastructure for the growth of skilled employment. The second side of the employment is also inquired in terms of unskilled employment. The experts are reviewed negative approaches to it. The second statement and fourth statement are given priority by the model. For listed parameters in model the experts’ opinion is recorded negative. It is discussed about the ample opportunities available for the employment of unskilled mass in Ahmedabad district. The fourth statement – growth in unskilled employment has reduced the rate of unemployment drastically in district is also criticized by the experts.

The situational moderators’ level statements are also defined by the model. It justify the first two statements out of total five statements. The first statement is derive about

the frequent changes in environmental factors have played significant role in social development. The experts are not agreed with the statement and it shows negative approach to the model of development of UHDI. On other hand the second statement – cultural factors plays significant role in social development in district has been appreciated by the experts and it has positive impact to the model. The outcomes of model statistics are make clearer overview of consequent model. The model testing parameters are listed last to the model. The values of testing the model are Akaike criterion (AIC), Schwarz criterion (BIC), Log-likelihood, and Hannan-Quinn. All said assessments have least values compare to other tobit edifices. It is also perceptible here the error term of the model is figured least.

REFERENCES:

- [1] Abhishek T. (1992). Implication about the Variables of a Factor model with changing alteration. *Metrical* 36-49.
- [2] Abusaleh Shariff (1995) health Transition in india, NCAER, Oct 1995
- [3] Adnan (1984) Approximation of OLS based on robust testing. *Math-Statistics*, 67-85.
- [4] Bagchi, K.K. (2011). Regional Disparities in India's Socio-economic Development. New Century Publications. New Delhi. India 6)
- [5] Bajpai, N, Sachs, J.D. (1996). Trends in Inter-State Inequalities of Income in India. Development Discussion Paper No. 528. Harvard Institute for International Development, Harvard University.
- [6] BRICS (2012). Joint Statistical Report, 2012, BRICS.
- [7] Bunge, M. (1981). Development Indicators. *Social Indicators Research*, 9(3), 369- 385. 11)
- [8] Carr-Hill, R. (2013). Missing Millions and Measuring Development Progress. *World Development*, 46, 30–44. 29
- [9] Cetaler, S. Miranda (1997): Principle Component Analysis, NY, Alabama.
- [10] Dubey, A. (2009). Intra-State Disparities in Gujarat, Haryana, Kerala, Orissa and Punjab. *Economic and Political Weekly*, 44(26&27), 224–230.
- [11] Dutta, S. (2011). Efficiency in Human Development Achievement: A Study of Indian States. *Margin: The Journal of Applied Economic Research*, 5(4), 421–450.
- [12] Grene William (2003), *Econometric Analysis*, Prentice Hall New York.
- [13] Harris, R. J.: *A Primer of Multivariate Statistics*. New York, Academic Press, 1975.
- [14] Huberty, C. J., and J. D. Morris. 1989. Multivariate analysis versus multiple univariate analyses. *Psychological Bulletin* 105:302–308.
- [15] International Encyclopedia of the Social Sciences
- [16] Jha, R. (2014). Welfare Schemes and Social Protection in India. *International Journal of Sociology and Social Policy*, 34(3/4), 214–231.
- [17] Luc Anselin, Sheri Hudak, *Spatial econometrics in practice A review of software options*, September 1992, *Regional Science and Urban Economics*
- [18] Lutz, M. (1988). On Criteria of Socioeconomic Development. Paper presented at the annual meeting of the Allied Social Science Associations, New York, 1988.
- [19] Myrdal, G. (1972). *Asian Drama: An Inquiry into the Poverty of Nations*. Vintage Book, New York.
- [20] Nagaraj R.A., Varoudakis, A., Véganzones, M. (1998). Long-Run Growth Trends and Convergence across Indian States. Working Paper No. 131. OECD Development Centre.
- [21] Rakesh Shrivastava (2011) Statistical Evaluation of socioeconomic development some recent technique. *Sankhyavignan NSV* 7, No.1 & 2
- [22] Raymond J.G.M. Florax, *Vrije Universities Amsterdam and University of Amsterdam*; Peter Nijkamp, *Vrije Universities Amsterdam*, Misspecification in Linear Spatial Regression, Models, 2004
- [23] Sanjay G. Raval And Mahesh H. Vaghela (2016), “Brief Review for Quality of Education In Institutions of Gujarat State”, presented in Quest for Excellence and Efficiency in Higher Education, organized by H. L. Commerce College and A. G. Teachers College, 30th Sept – 1st Oct. – 2016.